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Earthlearningidea for the International Year of Planet Earth

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ABSTRACT Earthlearningidea will use the opportunity of the International Year of Planet Earth (2008) to publish on the internet a new Earthlearningidea each week for use in classrooms that have few resources. The International Year of Planet Earth (IYPE) was proclaimed by the United Nations for 2008, with the activities extending from 2007 – 2009. IYPE has a scientific programme with an equal and parallel outreach programme, with the objective of enhancing the understanding about the Earth of the global population. The Earthlearningidea activities are aimed at teacher trainers (pre-service educators) of teachers in science, geography and Earth science, and interested teachers as well. Each activity, using minimal resources, provides the opportunity for interactive and engaging teaching that will not only develop knowledge and understanding of how the Earth works at individual, local and global scales, but will enhance the investigational and thinking skills of pupils. Internet discussion around each activity will be encouraged through a blog. Readers can join us via our website www.earthlearningidea.com through linking to 'Blog - free subscription to ELI', by contributing to the global discussion, by offering expertise, and by providing support to this voluntary, fundless initiative.

KEY WORDS: Earth learning, earth science, global issues, IYPE.

Earthlearningidea: An Outline

Earthlearningidea is an initiative that plans to bring new teaching ideas about the Earth to classrooms around the world that have very few resources, and to encourage global discussion across the internet around each of the ideas. The initiative will publish one idea per week during the International Year of Planet Earth, 2008.

The International Year of Planet Earth

The International Year of Planet Earth was proclaimed for 2008 by the General Assembly of the United Nations in its Plenary Session on the 22nd of December 2005. The Resolution was tabled by the United Republic of Tanzania and co-signed by 82 nations. In October 2005, UNESCO's General Conference adopted a similar Resolution, also proposed by the United Republic of Tanzania. The aim of the International Year of Planet Earth is to demonstrate new and exciting ways in which Earth sciences can help future generations meet the challenges involved in ensuring a safer and more prosperous world.

The achievement of this aim will be supported by two major programmes

- Outreach Programme including educational ventures at all levels
- Science Programme concentrating on 'big issues' of complex interaction within the Earth system, and its long-term sustainability.

The initiative will seek to raise the awareness of the contribution to, and role of, the Earth sciences in society, in the minds of politicians, decision-makers, the media, and the general public. Governments will be urged to pay greater attention to the Earth sciences as affecting many aspects of the everyday lives of their citizens, with particular reference to applications in educational systems, governmental legislation and civil regulations, so as to take full advantage of this extensive source of expertise and experience. The IYPE logo and its explanation is in Figure 1.

What does the International Year's logo mean? - The International Year is intended to bring together all scientists who study the Earth System. Thus, the solid Earth (lithosphere) is shown in red (the full circle), the hydrosphere in dark blue, the biosphere in green (the two disconnected arcs after the full circle), and the atmosphere in light blue (the outer semi circle).

Figure 1. The International Year of Planet Earth Logo.

Strangely, the International Year of Planet Earth will run from 2007 to 2009, as indicated in the news about the United Nations proclamation on the IYPE website. 'The United Nations General Assembly, meeting in New York, has proclaimed the year 2008 to be the United Nations International Year of Planet Earth. The Year's activities will span the three years 2007-2009.' The International Year of Planet Earth was proclaimed for 2008 by the General Assembly of the United Nations in its Plenary Session on the 22nd of December 2005. The Resolution was tabled by the United Republic of Tanzania and co-signed by 82 nations. In October 2005, UNESCO's General Conference adopted a similar Resolution, also proposed by the United Republic of Tanzania.

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For the first time in the history of science-focussed 'International Years', outreach is planned to play an equal role with the science programme, and this will include a wide range of educational ventures. Details of the different themes of IYPE are described in a series of booklets that can be downloaded from the IYPE website. Information from the 'Outreach' booklet is presented below:

The Greatest Show on Earth

The International Year's Outreach Programme will work alongside its Science

Programme and have equal resources to support activity within its remit. However, the International Year is as much about public awareness as it is about science. Indeed if successful, it will constitute one of the biggest international promotional initiatives ever launched for any science subject.

... outreach initiative(s) should:

- emphasize the clear relevance and impact of Earth science on human affairs
- have a geoscientific dimension
- emphasize principles of sustainability
- stress holistic aspects of Earth System Science
- be global in relevance, no matter how local in application
- have demonstrable potential for developing countries and others with a need to participate in, and benefit from the applications of Earth science knowledge
- be based upon the key questions of the International Year's ...(ten) principal science themes ...
- be designed to make use of most modern technology, where appropriate (i.e. be deliverable electronically) ...
- be capable of producing clear "deliverables" (page 3)

'... the Outreach Programme (should) ... perform the main task set it by the International Year - namely, "to improve awareness generally of the huge potential within the Earth sciences to create a healthier, safer, and wealthier society."

This broad and ambitious goal requires that the International Year achieve three things:

- A better instinctive sympathy among the wider public for Earth scientists' work
- Better integration of Earth System Science within curricula, and greater academic visibility of Earth sciences within national education systems

Better understanding about the potential of Earth science for better planning decision-making among politicians and civil servants.' (p. 8)

The ten IYPE scientific themes are:

- Groundwater: reservoir for a thirsty planet?;
- Hazards: minimizing risk, maximizing awareness;
- Earth and Health: building a safer environment;
- Climate change: the 'stone tape';
- Resources: sustainable power for sustainable development;
- Megacities: going deeper, building safer;
- Deep Earth: from crust to core;
- Ocean: abyss of time;
- Soil: Earth's living skin;
- Earth and Life: origins of diversity.

Earthlearningidea: Committed to Education through Earth Science Across the Globe

The aim of Earthlearningidea, as described in the formal proposal is: 'To develop an internet-based support network for teacher trainers and teachers of earth science across the globe, by providing educational resources that will promote interactive teaching and the development of investigational and thinking skills, whilst provoking educational debate – minimising costs by using voluntary effort and commitment wherever practicable.'

The way that this will work is that a new Earthlearningidea will be published on the website, http://www.earthlearningidea.com (Figure 2) each month in the final four months of 2007, as a build up to the 2008 IYPE. During 2008, a new idea will be published every week. After 2008, it is hoped that contributors from around the globe will contribute new Earthlearningideas to keep the ball rolling.

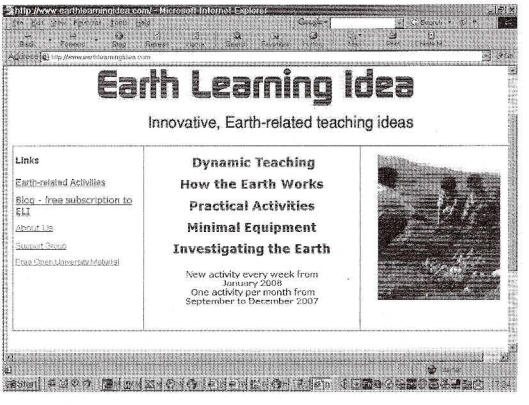


Figure 2. The Earthlearningidea website.

The ideas are aimed primarily at science and geography teacher trainers (pre-service teacher educators) across the globe who are educating the teachers of tomorrow. However, we hope that many classroom teachers with an interest in Earth science and access to the internet will sign up too! The ideas should work in classrooms that have minimal resources, as materials and apparatus are not available to many teachers. As each Earthlearningidea is published, it will be accompanied by a comment on the blog (http://earthlearningidea.blogspot.com) to encourage global debate around the idea – with the long-term objective of developing a worldwide discussion network around Earth learning. To further encourage discussion, we are identifying experts around the world to join our support group and to offer expertise when there are questions that the Earthlearningidea team cannot answer. See the Earthlearningidea flow chart in Figure 3.

Each Earthlearningidea is designed to enhance knowledge and understanding about the Earth through interactive teaching, often using practical activities with simple materials. The activities enable the development of investigational and critical thinking skills in pupils. Each activity is accompanied by 'Back up' notes for teachers, including: pupil age range; pupil learning outcomes; the context of the activity; suggested answers to any questions asked; how to follow up the activity; the

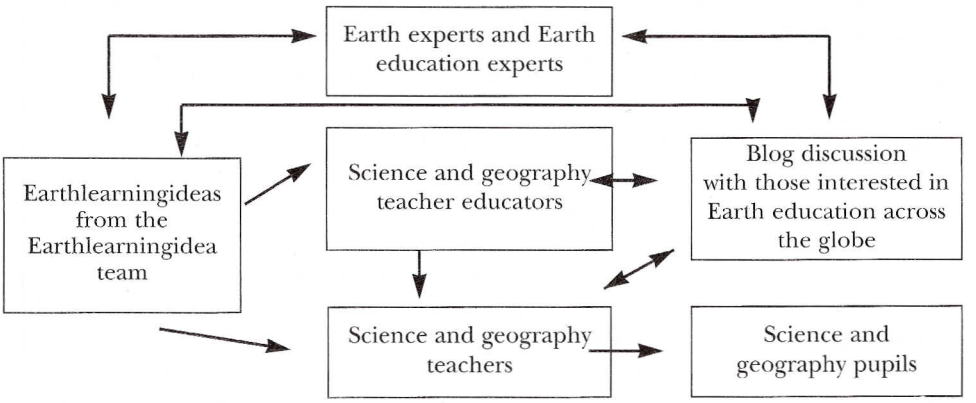


Figure 3. The Earthlearningidea Flowchart of Ideas and Discussions

underlying principles; how thinking skills can be developed, a resource list and useful web-links. An Earthlearningidea example is given at the end of this article.

Earthlearningidea is being run without funding, using voluntary effort and free webtools. So, we greatly value the support of colleagues involved in education and Earth science around the world.

You can help us by:

- **If you are a teacher trainer (pre-service educator) in science, geography or Earth science**, subscribe free of charge via our website www.earthlearningidea.com to receive a new Earthlearningidea each week during 2008 and beyond. Then discuss the idea with other interested people across the globe at http://earthlearningidea.blogspot.com - or ask an expert if you have questions.
- **If you are a teacher of science, geography or Earth science**, subscribe free via the website and join the discussion too.
- **If you are an Earth scientist, or someone interested in Earth science education**,

a) send us the contact details of teacher trainers or teachers across the globe who you know are interested in Earth education (*Country *Name *Email address *Institution name) at: info@earthlearningidea.com and/or

b) contact info@earthlearningidea.com to offer your expertise as a member of the Earthlearningidea support group. We need offers of expertise in: geological time; evolution of life; Earth materials; Earth energy; Earth as a system; natural hazards; resources and environment; investigating the Earth and Earth education.

- **If you want to offer general support**, please email your moral support to us through info@earthlearningidea.com – as a voluntary, fundless initiative – we value all the support we can get!

A Springboard to the Future

Earthlearningidea has the potential to use the springboard of the International Year of Planet Earth to enhance Earth education across the globe – but this

depends on you. All we can do is to publish the ideas week by week. We need you to give us the contacts across the globe, to subscribe and contribute, and to offer us the moral support needed by a voluntary, fundless initiative.

Do join us, it is all free, and the least that can happen is that you will gain insights into how the Earth works that you might not have anticipated. The most that can happen ... well who knows? Could we reach teachers in every country across the globe? Could we help didactic teachers across the world to teach in more interactive ways? Could we enhance the thinking and investigational skills of pupils? Could we provide new insights into how the Earth works in ways that will develop new understandings and interest, will aid the sustainable development of resources and expertise, and may even save lives? We could, but only with your help.

Earth education involves learning about the Earth we live on and our interactions with it at individual, local and global scales. Earthlearningidea can help us to work together to enhance Earth education across the globe. Join us to promote and enhance Earth education worldwide.

References

Earthlearningidea website, http://www.earthlearningidea.com

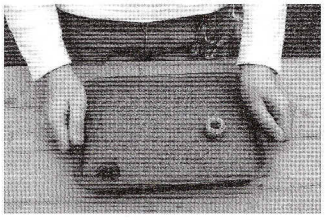
International Year of Planet Earth website, http://www.esfs.org/index.htm

A sample activity from: http://www.earthlearningidea.com - Earth-related Activities - Quake shake.pdf

Quake shake – will my home collapse? When an earthquake strikes – investigate why some buildings survive and others do not

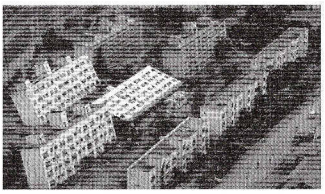
Set up the demonstration out of sight of the class. Place a flat piece of wood in one end of a tray and then fill the whole tray evenly with sand, so that the wood is hidden. Soak the sand thoroughly with water, then pour off the surplus water. Place two heavy objects, of identical shape and mass, representing buildings, gently on the sand at each end of the tray.

Explain that when earthquakes occur, the ground shakes violently. The model represents two buildings standing on wet sandy ground. Ask the pupils to say what they think they will see when the tray is shaken from side to side. Then shake the tray repeatedly, whilst the tray is resting on a table.



The shaker tray in action

After a few shakes, the sand can be seen to liquefy, and water rises to the surface. One "building" either topples over, or sinks into the sand, while the other one stays upright and does not sink. Ask the pupils to explain why they think this might be.



What earthquakes can do to buildings on soft ground

They usually offer many ideas for what they have seen, but they seldom think that the teacher has done anything so underhand as to hide a solid object under the sand! The shaking reduces the load bearing

strength of the sand, as the water forces the grains apart, so that the 'building' without a solid support underneath falls over or sinks. This happened when Mexico City, which is built on an old lake bed, was hit by an earthquake and many buildings with poor foundations collapsed. An earthquake of the same magnitude will cause far less damage to a building built on rock.

The back up

Title: Quake shake

Subtitle: Will my home collapse?

Topic: When an earthquake strikes, investigate why some buildings survive and others do not. How buildings with different foundations respond to earthquakes.

Age range of pupils: 7 – 18 years

Time needed to complete activity: 5 minutes

Pupil learning outcomes: Pupils can:

- demonstrate how the shaking of damp sand, as if by an earthquake, reduces its strength
- explain how providing a foundation increases the strength of shaken sand, allowing it to bear loads. The foundation does not increase the strength of the shaken sand. The piece of wood provides a raft-type foundation which allows the building to 'float'.

Context: The activity could form part of a lesson about earthquakes and their effects. It could also form part of the preparation for the best way people should respond to an earthquake in earthquake-prone areas.

Following up the activity: Try a websearch for real data.

Underlying principles:

- the slow movement of the Earth's plates causes stress to build up in the rocks underground.
- eventually the rocks break (brittle failure) at a fault, and the rocks spring back (elastically) causing shock waves.
- two forms of shock waves are produced, longitudinal (primary, P-) waves and transverse (secondary, S-) waves.
- these waves reach the surface and cause surface waves – undulations of the Earth's surface.
- the waves cause solid rocks to move, but when they hit waterlogged sand, the sand can lose cohesion and 'liquefy' causing heavy masses (eg. buildings) to sink, fall over or collapse.
- people are hurt or killed by the collapsing buildings, falling broken glass or subsequent fires.
- the safest place during an earthquake is usually out in the open, away from buildings that might collapse.

Thinking skill development:

- the contrast between one 'building' sinking and the other not causes cognitive conflict (mental challenge)
- further discussion about what we should do when an earthquake hits caus-